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CONTENTS

BRIEFS

PRODUCTION OF L-AMINO ACIDS--A process to produce L-amino acids was developed in the context of the Federal Government's Biotechnology Program, as reported by Minister for Research von Buelow. Using a new concept, whose essential factor is an enzyme-membrane reactor, the biologically active L-form of amino acids can be obtained. To date, L-amino acids are mainly produced with suitable microorganisms. The special feature of the process is that a mixture of L- and D-amino acids is chemically produced and then enzymes (biocatalysts) are used which can recognize quite specifically only the biologically interesting form of the amino acids, namely the L-form; thus separation from the inactive D-form becomes possible. In this, the enzymes are used in a soluble form. A membrane keeps the enzymes in the reactor while the amino acid obtained can pass through the membrane and be separated out. In contrast to today's usual production process, the new process is expected to provide substantial improvement in the economic efficiency of the production of amino acids. Worldwide every year about 400,000 tons of L-amino acids are produced. They are required in the medical sector for infusion solutions and for special diet foodstuffs. Beyond that, in the animal feed sector there is a great need, since feed grain, for example, does not show the optimal composition of amino acides for each kind of animal. [Text] [Duesseldorf VDI NACHRICHTEN in German 12 Feb 82 p 4] 12124

CSO: 3102/198

CHEMICALS

SMALL-FIELD OIL EXTRACTION TECHNIQUE TESTED

Bern TECHNISCHE RUNDSCHAU in German 16 Feb 82 p 21

[Article by Michael Gunton: "New Development in Offshore Technology: Test Operation in the 'Beatrice' Small Oil Field"]

[Text] Sooner or later the large oil fields in the North Sea will be depleted. In order to be prepared for this occurrence, work is underway today on utilizing small oil fields, too. In the British Beatrice test field the first experiences in this connection have been gathered.

The start to test production in the British National Oil Company's (BNOC) Beatrice field in Moray Firth off the northeast coast of Scotland marks the highpoint of the work in an oil field that is unique in the North Sea. In contrast to the other fields where pumping is going on or where development is underway, Beatrice is located in relatively shallow water only 45 m deep and is closest to the coast at a distance of only 20 km. The kind of oil alone makes Beatrice different from other North Sea oil fields. The oil has a large wax content, is highly viscous and must be specially treated in order to be able to flow. The location of the field near the coast also causes special monitoring problems in respect to environmental pollution.

The Beatrice oil field was discovered in 1976 in an area which until then had been ignored by the oil industry although the existence of a natural oil outcrop on the bottom of the firth had long since been established. The first successful bore was soon followed by others and in 1977 the field was classified as commercially exploitable with reserves estimated at 160 million barrels. This estimate was subsequently revised to 450 million barrels.

In 1978 the development work started which included the construction of three offshore platforms, the use of a lifting rig and the laying of a pipeline to a new coastal terminal in Nigg. When full pumping capacity is reached the field will deliver 100,000 barrels a day.

High Wax Content: Both Advantage and Disadvantage

Although the specific weight of Beatrice oil is similar to that of other kinds of crude oil in the North Sea, it has a special characteristic which makes

it difficult to handle: a very high wax content of 17 percent. In order to neutralize this property an inhibitor (Pour Point Depressant) must be injected into the drill holes; it must first be heated, something unique in the development of North Sea oil fields, in order to lower to an even greater degree the viscosity of the oil. Also the oil reserves of the field are under relatively small pressure and thus have an abnormally low gas content. This means that pumps had to be installed deep in the drill holes in order to get the oil to the surface.

The oil that is pumped is first piped to the production platform where gas, water and solid matter are extracted to a large degree. The gas serves as an energy source for the platform equipment and for the pumps installed in the drill holes, while the water is purified and pumped back into the sea. From the platform the oil passes through an 80-km long pipeline to the terminal in Nigg where it is warmed and further treated in order to extract any remaining volatile gases, water and solid matter. Then it is stored in two large isolated tanks until it is transported by tankers.

Special protective measures had to be taken for the area around the oil field since the Moray Firth has an attractive coast with a large variety of fauna and rich fishing grounds. Although the high wax content of the oil makes pumping difficult, it proves to be an advantage in combatting pollution. In the relatively cold water of the firth the oil tends to coagulate and under normal conditions can be collected without problem with nets by stand-by ships. In order to avoid spilling oil while loading the tankers, a permanent derrick system was installed. The personnel entrusted with pollution control works with the new "spring-sweep" system of the national Warren Spring Laboratory with which the oil can be drawn off the surface of water or mud using gigantic vacuum pumps.

The Beatrice field oil, which was developed at a cost of 550 million pounds sterling, will not only contribute to Great Britain's oil supply, but moreover, will provide industry with useful experiences as precursors of a type of smaller fields which must be developed in the future in order to maintain oil production at a time when pumping in the large fields will gradually diminish.

12124
CSO: 3102/198

ELECTRONICS

CII HONEYWELL BULL R&D IN MICROPACKAGING TECHNIQUES

Cologne ONLINE in German Jan/Feb 82 p 72

[Article: "Honeywell Bull: Chip Coupling a la francais"]

> [Text] Three hours by car southwest of Paris on N23 Paris—Le Mans lies Angers, a French city of 300,000. Typical scenery for this region consists of the castles and citadels along the Loire which bring back memories of the stirring, royal past. In just this atmosphere settled CII Honeywell Bull from Paris in 1962 and established with 4 production buildings a center of French computer production.

Along with basic research, system recycling and production control, micropackaging has been a prime focus since 1978. This special chip packaging known as SP 32 Technology is supposed to result in a more reliable connection between substrates and chips. The technical challenge of integrated circuits lies in the stacking of functions on the extremely small chip surfaces; and the denser the packing, the more difficult the connection to the outside world. For CII Honeywell Bull, micropackaging is the answer to this "wiry problem."

Piggyback Solves the Space Problem

The first step and another French patent is chip mounting after sawing the wafer, the platform which carries microprocessors, memories, etc. The integrated circuits are built up in waffle fashion on the round silicon plates. A diamond saw separates the individual chips which at this point still have no external circuit connectors. The silicon tablets are inserted into a square hole punched in a strip of ordinary 35 mm photographic film. Copper foil and the light-sensitive photographic emulsion make the film an intermediary for connecting the chip with the outside world.

All of the required electrical connections radiating out from the film hole are photographically exposed through a suitable mask. This ensures that the chip contacts mate up with the conductor strips on the film; finally, the two are connected by a bean of solder. Angers named this process "Tape Automated Bonding." With the chip removed from the film roll, CII HB can load several silos with different chip models. These filling stations dispense their contents for mounting on the substrates.

This conducter plate, or substrate, is a multilayered ceramic square with a network of externally-attachable gold conductors running on and through the material. This ceramic plate also carries the functional chip. On the top side of the substrate, 15 cooling fins are affixed for improved heat rejection.

The advantage of this piggyback construction is a large number of tabs (184) which connect to ordinary circuit boards. In contrast, an LSI microprocessor chip presents a maximum of 40 connectors.

CII Honeywell Bull has successfully employed this process for 3 years and is convinced that it also provides improved system reliability. It is hoped that nationalization--if it comes--will not dampen this computer manufacturer's innovative capability.

9160
CSO: 3102/192

PLANT TO CONVERT ANTHRACITE TO SYNTHETIC NATURAL GAS

Duesseldorf VDI NACHRICHTEN in German 12 Feb 82 p 1

[Text] For the present synthetic natural gas from German anthracite will not be in a position to play a significant role in the public gas supply, but the technical possibilties and processes must still be researched in a timely manner. Thyssengas, Ltd, Duisburg (50 percent of its capital is in state - owned VIAG [United Industrial Enterprises, Inc] and 25 percent each in Exxon, New York, and Shell, The Hague), and Didier Engineering Ltd, Essen, on 29 January 1982 presented to about 120 experts from economics and politics their pilot plant which was built on the grounds of Ruhrchemie Oberhausen; 60 percent of the DM50 million construction costs were borne by the Ministry for Research and Technology.

Since 1977 the technical possibility of realizing the Comflux process, which was developed by Thyssengas and Didier, has been undergoing testing in a semi-technical stage. In the new pilot plant this process for methanation of coal gas is to be improved; moreover, the partners anticipate important findings for the construction of an industrial scale demonstration plant. The goal is to convert in a fluid bed reactor coal gases containing carbon monoxide with a low fuel value into methane which can then be utilized without any problem in the public gas supply.

Project director Dr Werner Lommerzheim explained that the production of synthetic natural gas (SNG) is done in two operations. First, the anthracite is converted to coal gas by using oxygen and steam. However, this gas consists mainly of carbon monoxide and hydrogen and because of its too low fuel value and the too high ignition velocity it cannot be used for the public gas supply. Thus, coal gas is converted to SNG whereby that process favored by Thyssengas, in contrast to the conventional process, accomplishes the methanation in a single reactor. This becomes possible because of the specifics of the Comflux process.

The catalyst used causes both reactions, namely methanation and conversion of the goal gas; moreover, the reaction takes place in a fluid bed reactor and not in a fixed bed reactor. The fluid bed reactor permits especially high heat removal with an isothermic (constant) procedure. The technical reactions consist in the fact that in the process of methanation carbon monoxide and

hydrogen combine to form methane (CH_4) and water and in the conversion a part of the existing carbon monoxide with water forms additional hydrogen and carbon dioxide.

In the fluid bed reactor the coal gases set the powdery catalyst into a whirling motion. Hot grains cool down in the process by mixing with colder particles and by means of integrated heat exchangers. In this way superheating is avoided because large quantities of heat are released by methanation and conversion. This reaction heat can, according to Lommerzheim, be converted almost without loss into high quality process steam which can be utilized in a number of ways. In Oberhausen the neighboring coal gasification plant is available for this, which, using the fixed bed process, produces coal gas as a chemical raw material for Ruhrchemie.

12124
CSO: 3102/199

MINISTER OF INDUSTRY INTERVIEWED ON MACHINE TOOL PROGRAM

Paris L'USINE NOUVELLE in French 3 Dec 81 pp 66-68

[Interview with Pierre Dreyfus, French minister of industry, by Georges Le Gall, Rene Le Moal and Alain Pauche: "The Machine Tool Program Under Way"; place and date of interview not given]

[Text] The skeptics will say: "Still another plan for the machine tool industry!" It is true that since 1945 the plans have been as numerous as they have been unfruitful. And the one of 1975 ended in a complete fiasco: It projected for 1980 a minimum production of 130,000 tons; actual production was 69,000 tons! But this time the government appears determined to put in place the necessary means for attaining its ambitious objective. Be that as it may, the French machine tool industry, which 1 year ago, through its union, was demanding a massive intervention by the public authorities, will have its future at stake over the next few years. It will either come of age and take a significant place in the world market, or it will be relegated to the role of a supernumerary. In an interview with L'USINE NOUVELLE, Pierre Dreyfus, minister of industry, explained how he plans to win.

[Question] The machine tool developmental program, announced by the president of the Republic in June, is now ready and should get under way after its examination by the Council of Ministers. Why has the government made of this sector a high-prioritied industrial objective?

[Answer] For a very simple reason: The machine tool program interests not only that industry's 20,000 workers; it directly concerns the future of the 3,500,000 persons employed in industrial manufacturing as a whole, in that the latter cannot be competitive if it uses ancient machines. Our machine tool inventory is in the process of aging from the maintainability and the technological standpoints. The fact is, we have 10,000 numerical-controlled [N/C] machines, whereas the FRG has 30,000, Japan has 50,000 and the United States has 70,000.

[Question] What are the primary objectives of the program?

[Answer] The plan is based on taking advantage of the technological revolution that has been wrought by microelectronics, which has made of the machine tool a

high-technology industry. On the basis of the projected boom in N/C machine tools as catalogued items, sales of which for domestic use in France and for export should increase by 40 percent per year, our objective is to double our total French production of machine tools between now and 1985. This means, in the first place, a reconquest of our domestic market--a decline in foreign machines from 60 percent to 30 percent of our inventory--and, in the second place, a development of our exports, especially to industrialized countries.

[Question] Are these objectives realistic?

[Answer] I cannot deny that they are ambitious, since international competition in this field is very lively. But they are not beyond our reach. Success will depend upon the mobilization of all the partners: government, builders, clients, technical centers, etc. After all, the Japanese predominance in N/C machines had its genesis in a concerted action among the industrialists there and their government, concretized in a law supporting their machine-tool and data-processing industries, passed in 1978 after a period of serious crisis and heavy losses suffered by the principal Japanese builders.

[Question] What period will this program cover?

[Answer] The objective is the bringing into being over the medium term--within 3-5 years--of a competitive French industry in the domain of high-technology machine tools. The initial program covers 3 years; it will be revised in accordance with the results obtained and the evolution of the situation.

[Question] What funding will be provided by the government?

[Answer] Most of the necessary funding will come from normal sources: shareholders and financial institutions. But, given the importance the government places on this program, it will certainly allocate sufficient public credits to provide it with significant leverage.

[Question] There can be no serious growth in production if the domestic market continues anemic. Its volume declined by 30 percent between 1973 and 1980, and orders during 1981 have declined even more. How do you plan to reverse this downtrend?

[Answer] Our objective is specifically to place 16,000 new numerical-controlled machines in service between now and 1985. Selective measures in support of domestic demand will be put in place, including, in particular, expansion of the MECA [Advanced Design Machines and Equipment] procedure (for the acquisition of machines and equipment of advanced design) and robotics loans. An active policy of public sector orders (from the Ministry of Education, the Adult Occupational Training Agency, the arsenals) will be implemented with a dual objective: To facilitate reconversion of the machine tool sector through the launching of high-technology machines, and train the future workers in that industry on modern equipment.

In addition, the broader public sector is going to invest heavily, put its shoulder to the wheel and operate to attract private investment. Lastly, the ADEPA [Agency for the Development of Automated Production] is going to intensify its efforts in support of the PMI [Small and Medium Industries] by beefing up its regional setup.

In sum, the plan is to abandon the current vicious circle--in which the French machine tool industry does not put out enough sufficient modern equipment, and the clients distrust this industry--and go into an upward spiral by simultaneously stimulating the supply and demand for modern machines.

[Question] Does the plan also provide for aid to exports?

[Answer] It does indeed provide for measures to stimulate sales to foreign countries. These are included in the current discussions on assistance to foreign trade.

[Question] In July, you indicated there is a need to "adapt structures." How will this be done?

[Answer] As you well know, I am not obsessed by size. In certain specialties, the PMI's can very well grow, on the domestic market as well as in the export sector. It is just as true, however, that some regroupings are necessary. But it is not only the production tooling structure that needs improvement. Research and the training of workers require attention. I would like to see the research and development effort, which is to be augmented, divided between collective and individual research among the enterprises.

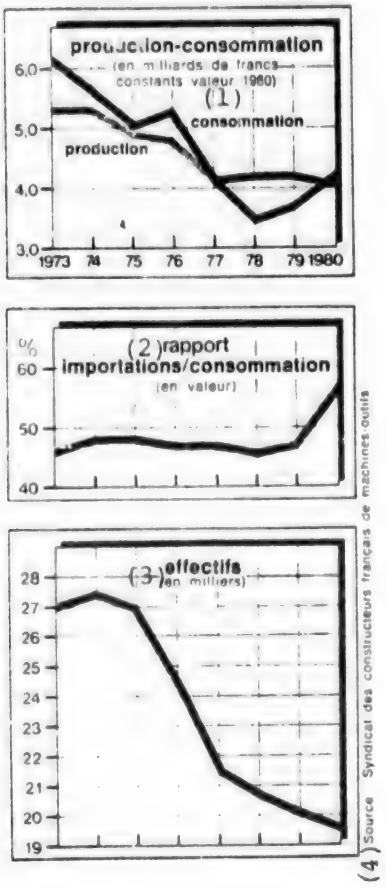
Three technological poles will be set up around which the national technological effort will gravitate: The CERMO [Machine Tool Research Center] and the ENSAM [Ecole Nationale Superieure des Arts et Metiers]; the ADEPA; and the CETIM [Mechanical Industries Technical Center]. Each of these poles will have a specific orientation and will coordinate the operations of various scientific bodies. The staffs entrusted with the management of these three poles will be strengthened by persons coming from major using industries, such as the automobile, aeronautics and armaments industries.

And this combined technological innovation effort will be enhanced by a program for the training of engineers and of highly specialized technicians in automation and production techniques.

[Question] But will the structure of our machine tool industry be changed?

[Answer] Yes. And the restructuring will concern components as well as complete machines. Taking as an example what is occurring in Japan, French builders must be able to procure components at competitive prices, since these represent a

Halting the Decline



Key:

1. Production and consumption (in billion francs at constant 1980 value).
2. Ratio of imports to consumption (in terms of value).
3. Permanent employees (in thousands).
4. Source: Association of French Machine-Tool Makers.

The objective of the machine-tool program is to halt the decline of French industry in this sector, which has dropped to eighth place worldwide, just ahead of East Germany and...Romania, China, Poland, etc. An end must be put to our chronic weaknesses: Production lower than our consumption; a very high rate of imports to satisfy domestic demand; a foreign trade deficit (In 1980, overall coverage of imports by exports totaled 93 percent, but not over 29 percent with the FRG and Italy, which alone represent half our purchases abroad).

growing percentage of the cost of machines. The outlook for increasing our production of N/C machines--we are projecting 5,000 units in 1984--justifies a national effort in support of the creation and development of a powerful industrial sector for the fabrication of components intended for machine tools and robots.

To be competitive with foreign producers requires moreover a certain minimum production capacity by types of machines. The planned regroupings will provide the opportunity for the rebuilding of highly competent management teams and design departments of adequate magnitude. These regroupings will involve substantial investments from the marketing as well as the production standpoints, including, in particular, the introduction of flexible workshops.

[Question] Do you think the industrialists are prepared to go along with these regroupments?

[Answer] I believe they are. As you well know, the program was not drawn up behind closed doors by government officials. Between August and October, more than 200 persons, representing enterprises, clients, suppliers and managements, took part in drawing it up. During these meetings, the need for a reorganization of French industry was brought out, and this view is shared by industry managements.

Contracts will now be negotiated between the government and enterprises. They will be based on specialization of product lines, standardization of components, the training and employment of highly qualified personnel, and an incremental growth in their French domestic and export sales turnover. The problem of the extent to which investments will be covered by public funding will obviously have to be dealt with during the negotiations. And I wish to emphasize that these developmental contracts can be signed with enterprises that have decided to remain isolated as well as with those that may have chosen to merge.

[Question] Beyond machine tools, what will be your policy as regards the machine industry in general?

[Answer] Concurrently with the machine tool program, and by way of the same process, I plan to undertake a robotics program. Generally speaking, the objective is to endow France with a powerful and competitive capital goods industry. In fact, with the decision to institute measures to help the textile industry I also announced that a developmental program for textile machines would be drawn up.

9238
CSO: 3102/159

FRENCH GOVERNMENT ACTS TO SAVE MACHINE TOOL INDUSTRY

Bern TECHNISCHE RUNDSCHAU in German 16 Feb 82 p 34

[Article by Helmut Altner: "Tax Payers Will Revitalize Selected Branches of French Industry"]

[Text] Several branches of French industry have suffered serious setbacks at home and have registered little progress in export markets. In recent months these industries have intensified their efforts to convince the new socialist-communist government that only restructuring programs with high government subsidy will be able to force down the foreign share--often over 50 percent--of the domestic market and help French industry wrest a greater share of the export market from foreign competitors. They are banking on the government's expressed objective to reduce by half the import of certain industrial and consumer goods and to increase exports by a significant percentage.

The Government Will Pay for Private Neglect

Among the branches in dire need of government subsidies running into the billions are machine design and general machines as well as machine tools and textile machines. Foreign competition is especially strong in these sectors in both the domestic and export markets. This machinery gap is partly technological and is the result of several years of neglect.

The government's first rescue plan was developed for the machine tool industry. Minister of Industry Pierre Dreyfus presented a program in December which provides for doubling machine tool production, reducing imports by half and increasing exports over the next 3 years. F 4 billion will be spent to achieve this goal. The government will provide F 2.3 billion as direct aid while the remainder must be raised through loans. This "Machine Tool Plan" is supposed to end the industry's 7-year crisis and make it competitive again. Similar earlier plans, such as the government's 1976 program for support of the machine tool industry, failed. The result was practically nil in spite of large government subsidies.

The number employed in the machine tool branch decreased between 1975 and 1980 from 27,000 to 19,000. Several companies in this highly fragmented branch had to close their doors. With sales of F 4.1 billion and exports of F 2.18 billion, France, as a machine tool producing nation, has fallen behind not only the United States and the FRG but also Italy and Switzerland, winding up in eighth place in

1980. And by 1982 France will possibly have to be satisfied with ninth place behind the GDR.

Small and Medium-Sized Firms Stagnate

France's greatest lag in the face of foreign competition is in the latest NC machine tools. Today the French machine tool inventory is obsolescent and only 10,000 NC machine tools are in use compared to about 70,000 in the United States, 50,000 in Japan and 30,000 in the FRG. Also, a significant portion of these modern machines are imports. In spite of the government's highly subsidized "Numerically Controlled Machine Tools" plans, this branch has been unable to make the decision to commit large sums for the development of such machines. For the most part this is due to the fact that the more than 150 companies of the branch belong mostly to the PME sector, that is are small and medium-sized firms without adequate financial means. The strong foreign competition has caused many firms to fold. This holds, however, not just for the PME firms but also for many well-known large companies. For instance, GPS, Line and Ratier-Forest, which were among the largest manufacturers, have gone bankrupt. Several other large companies like Ernault-Souma are mired in serious economic difficulties. With the new rescue plan involving funds amounting to a year's income for the entire branch, the government will have a strong voice in restructuring. Most of the F 4.0 billion will be awarded as direct subsidies; the remainder will be made available as low-interest loans.

9160
CSO: 3102/200

ADVANCED SURFACE-TREATMENT TECHNOLOGIES IN USE IN FRANCE

Paris L'USINE NOUVELLE in French 21 Jan 82 pp 72-73

[Article by Edmond Degrange: "Thermal Methods of Surface Treatment Gaining"]

[Text] "More and more, conventional methods of heat treatment throughout, which are guzzlers of energy, are being replaced by localized methods of treatment," Mr Naylor, of the CETIM [Mechanical Industries Technical Center], pointed out at the recent meeting of the CETIM-ATTT [Heat Treatment Technical Association]. What is more, the well-known surface-treatment methods, such as cementation, nitriding and carbonitriding, are being added to by localized methods using electronic bombardment, lasers and ion deposition. "But," says Mr Basile, of the ENSAM [Ecole Nationale Superieure des Arts et Metiers], referring particularly to electronic bombardment, "this treatment is not a substitute for the conventional methods such as cementation or induction. It supplements them."

Its specific power is very high: Energy densities of the order of 10^6 to 10^8 W/cm^2 can be obtained; that is, 100 to 10,000 times greater densities than are possible with conventional methods of treatment such as induction or plasma. The temperature rise is very rapid and total heating is reduced. The result is very limited deformations.

Other noteworthy advantages are: Energy efficiency over 85 percent and the possibility of control over the heating cycle by means of a microprocessor, enabling in particular the surface to be swept impulsively instead of continuously.

The risks of local fusion in complex pieces are reduced, since the trajectories of the beam need not overlap. The depth of treatment can also be varied by programing the energy densities to be applied at each point. The thicknesses treated are of the order of 0.1-2.5 mm (1,500 cm^2/min at a depth of 0.75 mm, and 800 cm^2/min at a depth of 1.5 mm). They must be less than 1/4 the thickness of the piece. In the case of treatment of an interior surface, the bore must have a diameter of at least 50 mm. The hardnesses obtained are 2 to 3 points higher than those obtained with conventional treatments.

The performance of the laser-beam method is comparable to that of the electron beam, with the added advantage over the latter that it operates in an atmospheric environment instead of in a vacuum. Generally speaking, the laser used is of the

CO_2 type with a power of up to 5 kW and a beam diameter of the order of 20 mm, the sweep being obtained by mechanically or electromechanically (oscillating mirrors or segmented mirrors) controlled oscillation of the beam. One particular applicational niche: Selective treatment of geometrically complex pieces (gear teeth) and zones not easily accessed (tube interiors) with minimum distortion.

The need to coat the surface to be treated with an absorbent substance to avoid reflection of the beam presents no problem, since the coating is immediately vaporized without any resultant pollution of the surface.

Mr Decaux, of the Optilas Company, stressed another interesting feature of laser-beam treatment: Because of the power density obtained, surface alloys can be produced. This technique consists of locally depositing a very-high-resistance material over a softer surface. The problem currently under study is that of the bonding between the applied material (in powdered form) and the substrate. This is an extremely promising field of application. Other types of treatment are presently being studied; for example, the surface fusion of electrolytically deposited layers of nickel and chromium, on steel, to produce a stainless steel coating.

For claddings resistant to corrosion and wear, such as chromium or titanium carbides and nitrides, the ion deposition method also appears promising. These claddings have until now been obtained by chemical methods at high temperatures of the order of 1,000 degrees C. Ionic methods of treatment require much lower temperatures, generally less than 500 degrees C, and introduce no pollution problems. According to Professor Gantois (head of the Metallurgical Engineering Laboratory at the National Polytechnic Institute of Lorraine), for example, the ionic deposition method can be used to obtain a cladding of TiN at around 550 degrees C, on high-speed cutting steel, without altering the basic characteristics obtained by means of a prior heat treatment. Such a cladding increases considerably the useful life of cutting tools.

There is bound to be considerable development in the field of application of these depositional methods, but much work remains to improve their productivity and reproducibility of results. This aspect of standardization and control of quality has led to the development of nitrogen-based atmospheres, such as binary compounds of nitrogen and hydrogen and of nitrogen and hydrocarbons, which are simple and reliable. These atmospheres guarantee the absence of oxidation and decarburization of carbon steels, while preserving the safety aspect of nitrogen.

For controlled carbon-potential treatments (tempering, carburizing, carbonitriding), nitrogen-methanol compounds make it possible to restore all the conventional types of atmospheres used heretofore. This technique is used in the Alnat-C method developed by Air Liquide. Mr Kostelitz says in this regard, "Modulation of the nitrogen-methanol ratio enables the tempering of low-carbon steel. It also makes cementations possible with an augmented transfer of carbon to the surface. The technique of suspending carburization during weekends or work stoppages makes for increases in productivity the magnitude of which is the greater for cycles of longer duration. Furthermore, nitrogen-base atmospheres lend themselves well to automation and data processing of methods.

Cementation: An Automated Oven Control System

Another automation breakthrough, this time in the case of cementation: On the basis of a probe that determines the carbon content in the atmosphere of a gaseous cementation oven, the Logista Company has developed an automated oven control system. The measurements taken inside the oven on a continuous basis are processed and analyzed by a microprocessor. This makes it possible, Mr Pelegrin explains, to display on a screen and to edit on a printer a large number of parameters, such as the temperature, the carbon content of the oven's atmosphere, the duration of the cycle, and the influence of the alloy elements contained in the steel.

In its current version, this machine can control some 20 sequential treatment cycles without any human intervention. Currently under study is the possibility of regulating the temperature and the intake of support gas on the basis of information transmitted by the probe and processed by the microprocessor. Use of the system is especially easy; operator learning time need not be more than 2 or 3 days.

9238
CSO: 3102/159

NEW APPLICATION FOR ELECTRICAL DISCHARGE WELDING

Paris L'USINE NOUVELLE in French 3 Dec 81 pp 124-125

[Article by Jean Nenin: "Little-Known Applications of Electrical Discharge Machining"]

[Text] The Luziesa Company uses electrical discharge machining [EDM] to form cavities of all shapes, not otherwise "strippable," without affecting the metallurgical qualities of the metal.

It also uses this technique to produce artificial flaws for the purpose of calibrating nondestructive-testing instruments.

An Italian builder of high-powered marine engines (50,000-100,000 hp) was trying to devise a hollow exhaust valve that could be cooled by forced circulation of oil through a coaxial tube. The rim temperature can actually reach 900 degrees C, and the failure of a single valve, which can immobilize a vessel, represents a substantial loss.

A series of attempts to strip the inside of the valve body by electrochemical machining [ECM] gave unsatisfactory results. It was then decided to fabricate these valves by welding a lid over a flared stem that had previously been hollowed out by turning on a lathe. The welds, however, proved unsatisfactory using conventional methods, and the builder called upon the European research center ISPRA [expansion unknown], which is very well equipped for electron-beam welding. Again, the results proved unsatisfactory, given the severe operating conditions to which these valves must be subjected.

Any Point Can Be Reached From a 10-mm Diameter Hole

It was then that two ISPRA researchers thought of hollowing out the valves by the EDM method, using a remotely controlled orientable electrode. The first prototype, although rudimentary by comparison to the present more sophisticated and automated tool, was completed in 8 months, and a first run of 50 valves was fabricated. They operated successfully.

The method was patented and the EC Commission granted using rights in Italy, in Germany and to the Luziesa Company in France.

From a reading of the texts of the patents, the system of control (purely mechanical) of the electrode movements appears quite complex. It enables any point to be reached inside the body of a solid piece (within a radius of 50 mm, for example), from a hole 10 mm in diameter and 1 meter in length. This electrode can thus form cavities of all shapes, revolutional or not, flat-, convex- or concave-bottomed. This requires an assembly of mechanical components such as will permit the necessary combination of different movements to be effected in a restricted space: On the one hand, rotation of the electrode about an axis perpendicular to the axis of the initial bore (or of penetration), and on the other hand, a movement of translation of the electrode to determine the profile of the wall of the cavity.

During these various movements, the piece can remain stationary (to obtain a flat cavity) or be rotated (for a revolutional cavity), or a combination of these.

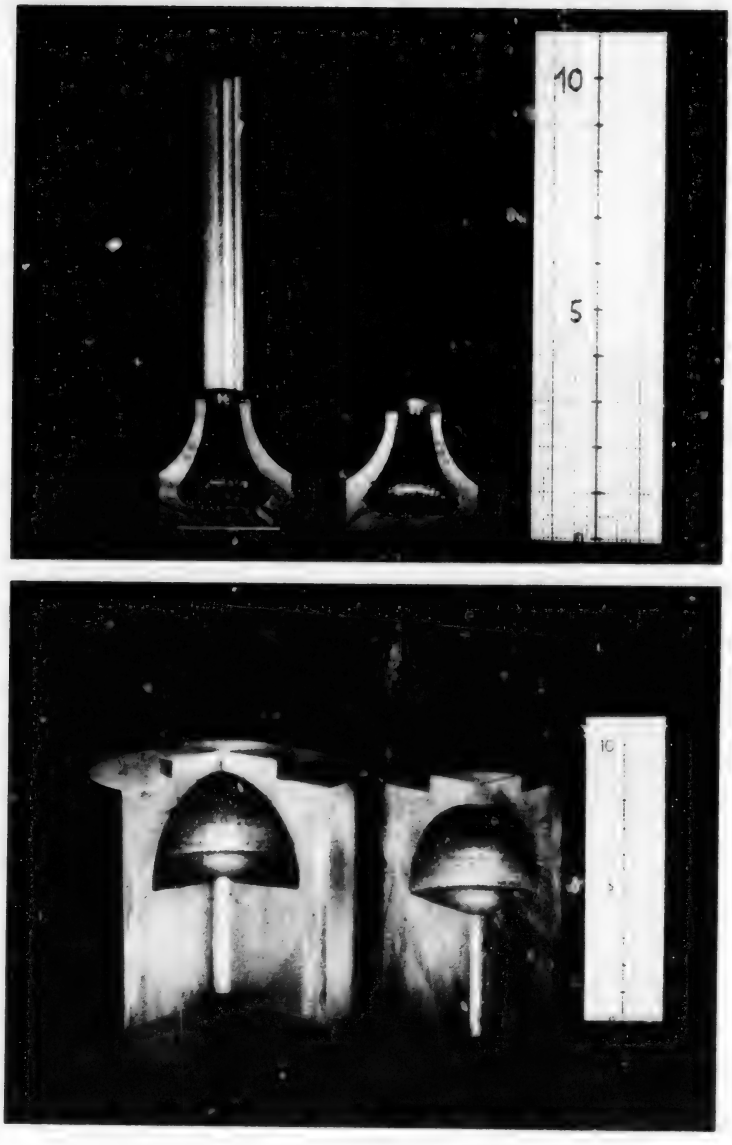
Equipment That Lends Itself to Miniaturization

The actual electroerosion takes place along a generatrix of the electrode, and the final profile of the cavity depends upon the geometrical form of this electrode. As regards desired surface smoothness, it can be obtained by proceeding from roughing to polishing. However, if the purpose of the cavity is to provide for cooling (as in the case of the valves), a relatively rough surface texture enhances the heat-exchange process by creating microturbulences.

This equipment is not limited to marine engine valves (16-mm bore). It lends itself to miniaturization and can be used for smaller valves (aircraft engines or Diesel engines). Tests are being conducted in the domain of turbine vanes, where mechanical strength and cooling are two imperatives. Other applications are being considered (high-pressure chambers subjected to pressures of 1,000-2,000 atmospheres).

The basic advantage of this method lies in its potential for hollowing otherwise unstrippable cavities under conditions that cannot be met by any other known method; that is, while preserving integrally the prior metallurgical characteristics of the metal or alloy that were present at the start of the operation. By contrast, if these cavities are obtained by casting (lost-mold or any other method), these characteristics will depend upon the conditions under which the casting is made; if the cavities are obtained by welding, the problem posed is that of the strength of the bond and of the actual continuity of the weld in the case of particular geometric configurations.

The Luziesa Company has also specialized in an activity that is probably unique in the private sector: The creation, in sound pieces, of artificial flaws for the purpose of calibrating nondestructive-testing instruments. These artificial flaws consist of small cracks, fissures, etc, produced at the request of the user at points in the piece where the same flaw may be expected to occur under actual operating conditions. For example, flaws 2.5 mm long, 0.05 mm wide and deep in stainless steel tubes, in the threading and barrel of studs and nuts for nuclear reactor vessels, as well as flaws in the hoops of alternators 1.75 m in diameter



These two prototype pieces, made by ISPRA researchers, were hollowed out by the EDM method, using a remotely controlled orientable electrode.

and weighing 750-1,000 kg, have also been created. These artificial flaws are of mechanical nature or related to corrosion phenomena. In the latter case, the corroded surface condition is also reproduced by the EDM method.

This type of flaw could easily be obtained by an accelerated corrosion process, but the method developed by Luziesa has the advantage of avoiding unwanted perpetuation of the corrosion process and of being perfectly reproducible.

Artificial flaws can be created on the client's own premises in the case of large pieces that are difficult to transport. A control report including a replica of the flaw, its dimensions and a sectional photograph of it is always furnished to the client at the same time. "We also do machining and and create artificial flaws by ultrasonic methods," says Mr Demoulin, "but the random character of the abrasive in suspension makes precision of the order of 0.01 mm particularly hard to obtain. In these cases, and provided the nature of the material permits, it is better to turn toward EDM."

9238
CSO: 3102/159

BRIEFS

NC MACHINES IN SWEDEN--More than 6,000 numerically controlled (NC) machines will be employed in Sweden by 1985. This was announced at a seminar jointly sponsored by the Swedish Metal Industrialists Employers Association and the Association of the Swedish Iron and Metal Working Industry. The number of NC machines employed in Sweden increased more than sevenfold during the 1970's, going from 500 units in 1970 to 3,600 units in 1979. The first industrial robots in Sweden were installed in the late 1960's, and by 1970 about 50 were in use. With an annual growth rate of 40 percent throughout the 1970's, the number reached 950 by 1979. An annual growth rate of 25 percent is projected for the 1980's which will bring the number of robots in service to 3,000 by 1985. The Swedish machine-tool industry is regarded as one of the most advanced in the world. In the Swedish manufacturing industry, more industrial robots and NC machines are used per employee than in any other country. As one of the world's leading robot exporters, Sweden is the third largest manufacturer of industrial robots behind Japan and the United States. [Text] [Duesseldorf VDI NACHRICHTEN in German 5 Feb 82 p 34] 9160

OLIVETTI 'SIGMA' ROBOTS--Olivetti and the American electrical manufacturing firm Westinghouse will collaborate in the area of industrial automation. An agreement to this end was recently signed by Westinghouse and OSAI (Olivetti Sistemi per L'Automazione Industriale), a member of the Olivetti group. The 5-year contract provides initially for the acquisition of 40 Olivetti Sigma robots by Westinghouse. In addition, Westinghouse will have the exclusive license for producing, distributing and servicing Sigma robots in North America. Sigma is a high-performance assembly robot whose arm moves about nine independent axes. The arm and the special sensors were specially designed for precision assembly work. In Europe Sigma is the most widely proliferated robot for use in precision mechanics, electromechanics and electronics. [Text] [Leinfelden-Echterdingen DIE COMPUTER ZEITUNG in German 3 Feb 82 p 2] 9160

CSO: 3102/192

DATA PROCESSING AGENCY REVIEWS SECOND YEAR'S ACCOMPLISHMENTS

Paris ZERO UN INFORMATIQUE HEBDO in French 22 Feb 82 p 5

[Article by Evelyne de Lestrac: "ADI's Second Year Assessment. Research, Training, Information"]

[Text] As it celebrated its second anniversary (see 01 HEBDO No 684) on 15 February, the Data-Processing Agency, now under the control of the Ministry of Research and Technology, could make a "positive" assessment of its activities and presented its new budget for 1982, amounting to a total of approximately 400 million francs, a 30 percent increase over last year.

On this occasion, Bernard Lorimy mentioned the three main lines which correspond to approximately equal proportions of the agency's activities: first, aid to research and pilot projects. Notice that 124 research contracts (approximately one third of all applications) were signed in areas considered to "have priority": CAD, automation and robotics, video and data-processing applications, CAI and software engineering. Other activities are being contemplated, especially the use of natural language and computer-assisted translation.

According to the agency's president, pilot projects "are the most effective means of enchancing communications between research and industry"; he mentioned the six projects now in progress, the two most recent ones being Nadir (1980) for the use of satellites in data-processing, and Rhin (March 1981) for the heterogenous networking of data-processing systems.

The second line deals with training; in this respect, the agency emphasizes the fact that it has contributed to train 1300 data-processing specialists and that it "will continue to work in this direction." The use of computers in education is one of the agency's objectives; it will be realized in the near future through the implementation of a "microelectronics program." This program, carried out in collaboration with the Ministry of National Education, aims at integrating microelectronics into education in some 30 IUT's [University Institutes of Technology] (see 01 HEBDO No 684).

Finally, "central theme from which the agency gains its experience," information on applications represents the third main line. Since its creation, ADI has multiplied its contacts with all professional categories (over 600 different professions to-date); last year it has signed 671 agreements, compared with 439 in 1980, i.e. an increase of almost 54 percent in one year.

Support Activities

This year, the agency plans to diversify and expand its activities through support functions, especially by intensifying its regional activities through "contacts between the agency and all local authorities" and the installation (upon request) of about a dozen regional organizers of data processing activities (AIR) during 1982. In addition, it plans to amplify its international "technoligical watch" potential by opening an office in Japan (after that in Sunnyvale, California) in the near future; it will also play a part in the creation of the World Microcomputing and Human Resources Center. It will also implement a "software packages program" which will associate designers and users, because "software must become industrialized in order to maximize the efficiency of our 'grey matter' potential," the president of ADI stresses.

Finally, economic and legal studies on the problems which arise in connection with the development of data processing are in progress. Some of the subjects treated: "System of Economic and Statistical Information on the Dissemination of Information on Data Processing Applications," "Data Processing and Work," "Economic Information and Data Banks."

9294
CSO: 3102/188

FRANCE, FRG: NEW AREAS OF SCIENTIFIC, TECHNICAL COOPERATION

Paris ELECTRONIQUE ACTUALITES in French 5 Mar 82 p 3

[Article: "France-FRG: Toward New Areas of Scientific and Technical Cooperation"]

[Text] France and the FRG are planning to intensify their scientific and technical cooperation, especially by extending it to new areas.

This is the outcome of the conversations which the ministers of Research and Technology of the two countries, Messrs Andreas von Bulow and Jean-Pierre Chevenement, had at the Franco-German summit meeting.

According to the French minister, they have agreed to develop their cooperation "on land, at sea and in space," including, whenever possible, the "European space."

In the field of energy, for instance, the two ministers--who are scheduled to meet in Brussels, on 8 March, with the other EC ministers of research--plan to revive the thermonuclear fusion research program so as to undertake the construction of new research "machines" like Thor Supra, which could be located at the Nuclear Research Center of Cadarache.

The two countries will consider the possibility of joint actions, especially in the field of solar energy to benefit developing countries.

A sizable effort will be undertaken in the area of microcomputing, and the two ministers have also decided to co-chair a meeting devoted to the study of their industrial policy, to be held toward the end of this year at the Ludwigburg Franco-German Institute.

A cooperation is also said to be taking shape in the area of surface transportation; it would combine the successful French TGV (high-speed train) and the German magnetic propulsion system in a future European network.

Generally, the ministers have decided to improve the use of their large scientific facilities by researchers of both countries. French researchers will be invited to the Bessy Institute in Berlin where very fine micro-lithographic techniques are being developed (they are of interest in making electronic components).

The French and the German are both in favor of the construction of a large synchrotron radiation research machine in Strasbourg.

In the field of oceanography, not only will research ships be "lent" to German researchers, but so will the '3,000' diving saucer. Moreover, the two countries are much interested in the construction of a European deep-drilling ship (up to minus 3,000 meters), in the exploitation of metal-containing muds, and in the harvesting of polymetallic nodules.

Generally, in line with the impetus which both countries wish to give to the exploitation of the ocean, German oceanographic laboratories will gain easier access to the French submarine research equipment.

Where space is concerned, France and the FRG (as well as other European countries) have recently decided to proceed with the construction of more powerful satellite launchers (Ariane IV model) and with the improvement of the space laboratory (Spacelab) launched on the American shuttle; they have now taken a number of measures with respect to the management of activities and programs.

In addition, initiatives are planned in the field of joint Franco-German scientific audiovisual productions aimed at the general public, in the field of scientific and technical information, etc.

9294
CSO:3102/188

BRIEFS

MORE AID FOR TECHNOLOGY--With a special support program Minister for Research von Buelow wants to promote more strongly the establishment of technology-oriented enterprises. In order to cope with the technological and social problems of the 1980's we must succeed in mobilizing the requisite "renewal forces." Young technology companies could make an important contribution in this area. According to the Ministry for Research and Technology an ad hoc committee has been established with the cooperation of banks, middle-level industrial firms and technology consultants. This "mixed"committee has since ascertained that the appropriate potential of ideas and personnel is larger by far than generally assumed, but special efforts are required in order to lower the "entry threshold" for establishing enterprises. [Text] [Leinfelden-Echterdingen DIE COMPUTER ZEITUNG in German 3 Feb 82 p 1] 12124

ELECTRONICS POLICY OUTLINED--At a meeting last Wednesday, the Cabinet appointed the general directors of the recently nationalized companies. On this occasion, the Minister of Industry, Pierre Dreyfus, outlined his industrial policy which, in the fields of electronics and computers, relies on the capabilities of Thomson, CGE [General Electric Company], Matra and CII [expansion unknown]-HB[Honeywell Bull]. The leaders of the recently nationalized companies include two newcomers, Alain Gomez at Thomson-Brandt and Jean-Pierre Brunet at CGE , and two oldtimers, Roger Fauroux at Saint-Gobain and Jean Gandois at Rhone-Poulenc ; to a greater or lesser degree, they will contribute to shape the new policy for the computer industry. As is known, the cases of Matra and CII-HB will be dealt with in a different manner. The President of the Republic and the Minister of Industry have commented on this implementation of the nationalization law; large excerpts of their comments are given in page 20 of this issue of 01 HEBDO. Concerning more particularly the industrial policy of state enterprises, the Minister of Industry restated his objectives: employment, competitiveness through an energetic expansion of investments and research, dynamism on the international market. He defined five fields of action: steel-making, chemicals, materials, health and electronics. "In the latter field," he stated, "the whole product line, from electronic components to robotics, will be the subject of a comprehensive policy relying on the respective capabitilies of Thomson, CGE, Matra and CII-HB." In addition, in a letter to the general directors of the nationalized companies, outlining their mission, the minister emphasized the necessity of achieving, first and foremost, "economic efficiency through a continuous increase in competitiveness." [Text] [Paris ZERO UN INFORMATIQUE HEBDO in French 22 Feb 82 p 1] 9294

CSO: 3102/188

TWO AUTO PROJECTS FOLD, LACK OF FUNDS

Copenhagen BERLINGSKE TIDENDE in Danish 15 Mar 82 p 7

[Article by Finn Knudstrup]

[Text] Efforts to carve out a Danish niche in the field of automobile production are going badly. The factory that produced the recycled Safari car just went under. At the same time, Energy Minister Poul Nielson turned down the request of the Danaford auto firm in Copenhagen for funds with which to develop a car that could run on gas from the North Sea.

The "mill car," or the Safari, as engineer Bent Due called the partially Danish-built car, is no longer being made. The six car production workers at the Mols factory have been given notice. Due was unable to obtain risk capital--he needed 1 million kroner. But neither the banks nor private lenders were willing to lend him the money. Bent Due's bank did not wish to comment on its refusal.

Bent Due himself said it was a bitter blow both for himself and for Denmark that production of the Safari car had to halt. The project which began a year and a half ago got up to only 20 cars. And Bent Due said that he had lost 1 million kroner.

The Safari car was based on renovated parts from Type 1 VW cars covered with a fiberglass shell. The Auto Inspectorate would not approve the model because they could not be sure that each car would be identical with the first approved car--precisely because the basic technology depended on used parts.

Natural Gas Car Turned Down

Danaford, a section of the K. W. Bruun auto concern, also lacks 1 or 2 million kroner needed to make a Danish car idea a reality--a Ford Taunus that runs on gas from the North Sea.

The firm optimistically ordered the parts for the car--in the belief that a car of this kind would be viewed as ideal by Energy Minister Poul Nielson. But the minister turned down the request for research funds, saying that there was not enough propulsion energy in natural gas. The energy minister

is more enthusiastic about diesel-powered cars because he thinks that much of the oil now used for heating will be left over when the natural gas project is completed. It would be more profitable to put this oil into cars than it would be to use gas, Nielson said.

Danaford's idea was based on natural gas users having a compressor that would put household gas under pressure so it could be blown into a car tank. In other words, one could tank up at home in the carport. But it is necessary to put the natural gas under 10 times as much pressure as in normal car [as published] gas--and that makes difficult demands on the technology. It was money for funding research that would solve these problems Danaford asked Poul Nielson for, but in vain.

There are cars powered by natural gas in both Italy and New Zealand.

6578
CSO: 3102/205

BRIEFS

PLASTICS IN BRITISH CARS--A 3-year development program amounting to 1.4 million pounds sterling has been started by a group of British manufacturers and suppliers with financing by the Ministry for Industry. Wheels, suspension arms and coil springs are to be developed from reinforced plastics. Replacing metals by plastics is viewed as a way of saving weight whereby fuel consumption can be further reduced. The technical program is being carried out in the National Engineering Laboratory in East Kilbride and in the Materials Engineering Centre of Aere Harwell. The consortium consists of the following companies: BL Technology, Ford Motor Co, British Petroleum, Ciba Geigy, Courtaulds, Pilington Brothers, Shell Chemicals, Turner and Newall, Dunlop, Jonas Woodhead, Lucas Industries, Mintex. [Text] [Duesseldorf VDI NACHRICHTEN in German 5 Feb 82 p 9] 12124

SUPER BATTERY--Odense--A cooperative effort that includes the energy research laboratory at Odense University, the mineral industry laboratory at Denmark's Technical College, the Royal Porcelain Factory and Haustrup's Factories in Odense is expected to result in Danish development of a super battery that can hold ten times as much energy as the current lead batteries. People at the energy laboratory in Odense have been working with colleagues in England and elsewhere for several years in an effort to come up with a battery that would hold five times as much energy as the batteries now being used. Now there are indications that trials in this country with ceramic materials could increase the efficiency tenfold. In addition there is every indication that a ceramic battery would be cheaper to use than the types of battery we are familiar with today. The battery is the central element in electric cars. Folketing has just lifted the tax on electric cars so that electric cars could compete with gasoline- and diesel-powered cars in both purchase price and operating costs. In Odense a car was recently demonstrated that is the first in a series of cars running on batteries. This car will be in great demand when and if the tests of the new batteries do well. [Text] [Copenhagen AKTUELT in Danish 5 Apr 82 p 20] 6578

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April 27, 1982